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NASA Procedural Requirements

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NASA Science Management

Responsible Office: Science Mission Directorate

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Change#	Date	Description
1	02/02/2005	<p>Paragraph 1.4, Principal Investigators -to clarify that principal investigator may provide findings to NASA by participating in peer review panels and may provide advice to NASA by participating in Advisory Committees (see NPR 1000.3, The NASA Organization, Section 6.2, Federal Advisory Committee Act (FACA) Committees).</p> <p>References citing NPR 1000.3A were changed to NPD 1000.3 in the following paragraph: 1.3, 1.4, 1.5, 2.1.3.2, 2.2.3.3, 2.3.2.3. Because NPR 1000.3A was changed to NPD 1000.3 in 12/17/2004, NPD 1080.2 required this update.</p>

Preface

P.1 Purpose

This NASA Procedural Requirements (NPR) documents the requirements for the planning and management of science programs at NASA. These requirements include solicitation and selection of research, quality assessment, and performance metrics. Requirements described in this NPR guide the development of Mission Directorate-specific science and technology management processes. These general principles also apply to the Headquarters Mission Directorate and Functional Offices which fund scientific research that is specifically reported as part of the Government Performance and Results Act (GPRA).

Responsibility for performance of Headquarters functions in NASA's science programs in conformance with this NPR and approved Mission Directorate-specific procedures is vested with the cognizant Mission Directorate (MD) Associate Administrator (AA).

P.2 Applicability

This NPR is applicable to NASA Headquarters and NASA Centers, including Component Facilities.

This document applies to basic and applied scientific research conducted by NASA or with NASA support including, but not limited to, research using flight missions. The underlying premise is that the document applies primarily to research whose final products are non-controlled, nonproprietary data. Nonproprietary data are data that may be distributed without violating patent, trade secret, or copyrights laws or NASA's ability to obtain and protect U.S. Government intellectual property rights. Research involving human subjects should be conducted in conformance with this NPR except in the areas of release and maintenance of resulting data (see NASA Policy Directive (NPD) 7100.8 and NPR 7100.1, Protection of Human Research Subjects).

This NPR does not apply to cooperative activities between NASA and the private sector that:

1. are primarily of an aviation system development nature, or
2. are conducted under Space Act Agreements, as defined in NPD 1050.1, Authority to Enter into Space Act Agreements. However, this document applies to proposals from the private sector responding to a NASA research solicitation. Certain cooperative or partnership arrangements involving cost sharing with the private sector may be excluded from the scope of this NPR by obtaining approval from the NASA Chief Scientist and the appropriate Associate Administrator.

P.3 Authority

42 U.S.C. 2473 (c) (1), Section 203 (c) (1) of the National Aeronautics and Space Act of 1958, as amended.

P.4 References

- a. 31 U.S.C. 1101-1119, 9703-9704, The Government Performance and Results Act (GPRA) of 1993, as amended.
- b. Executive Order No. NSTC-8 (National Science and Technology Council), National Space Policy, September 19, 1996.
- c. Executive Order No. 12866, Regulation Planning and Review.
- d. Office of Management and Budget (OMB) Information Quality Guidelines, October 2002
- e. Office of Management and Budget/Office of Science and Technology Policy Guidance on Research and Development Investment Criteria
- f. National Research Council, Managing the Space Sciences, National Academy Press, 1995.
- g. National Research Council, Implementing the Government Performance and Results Act for Research, National

Academy Press, 2001.

- h. National Research Council, Evaluating Federal Research Programs, National Academy Press, 1999.
- i. 5 CFR 2635, Standards of Conduct of Employment for Employees of the Executive Branch.
- j. 48 CFR Part 1872, NASA Federal Acquisition Regulation (FAR) Supplement (NFS) Acquisition of Investigations
- k. 48 CFR Part 1872, NASA Federal Acquisition Regulation (FAR) Supplement (NFS) 1825.70, Foreign Contract and International Agreements
- l. 14 CFR Part 1215, Environmental Quality.
- m. 14 CFR Part 1230, Protection of Human Subjects.
- n. 14 CFR Part 1232, Care and Use of Animals in the Conduct of NASA Activities.
- o. 14 CFR Part 1275, Research Misconduct.
- p. 28 CFR 50.3 (c) (II), Guidelines for the Enforcement of Title VI, Civil Rights Act of 1964, Procedures.
- q. 28 CFR 42.407 (b), Procedures to Determine Compliance.
- r. NPR 1000.2, NASA Strategic Management Handbook.
- s. NPD 1000.3, The NASA Organization.
- t. NPD 1050.1, Authority to Enter into Space Act Agreements.
- u. NPD 1080.1, NASA Science Policy.
- v. NPD 1360., Initiation and Development of International Cooperation in Space and Aeronautics Programs (Revalidated 3/29/04).
- w. NPD 1440.6, NASA Records Management.
- x. NPR 1441.1, NASA Records Retention Schedules.
- y. NPD 1600.2, NASA Security Policy.
- a`. NPR 1600.1, NASA Security Program Procedural Requirements.
- aa. NPD 2200.1, Management of NASA Scientific and Technical Information.
- ab. NPR 2200.2, Guidelines for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information (STI).
- ac. NPR 2810.1, Security of Information Technology.
- ad. NPR 4200.1, NASA Equipment Management Manual.
- ae. NPR 5800.1, Grant and Cooperative Agreement Handbook (14 CFR 1260).
- af. NPD 7100.8, Protection of Human Research Subjects.
- ag. NPR 7100.1, Protection of Human Research Subjects.
- ah. NPR 7120.5, NASA Program and Project Management Processes and Requirements.
- ai. NPD 7500.2, NASA Technology Commercialization Policy.
- aj. NPR 7500.1, NASA Technology Commercialization Process.
- ak. NPD 8500.1, Environmental Management.
- al. NPR 8580.1, Implementation of the National Environmental Policy Act and E.O. 12114.
- am. NPD 8910.1, Care and Use of Animals.
- an. NPR 8910.1, Care and Use of Animals.
- ao. Guidebook for Proposers Responding to a NASA Research Announcement (NRA).

P.5 Cancellation

None.

/S/

James Garvin,
Chief Scientist

Chapter 1. Roles and Responsibilities

1.1 The NASA Chief Scientist

1.1.1 The NASA Chief Scientist, located within the Office of the Administrator, serves as the principal advisor to the NASA Administrator on science issues and as a prime interface to the national and international science community. The Chief Scientist chairs the NASA Science Council to ensure that NASA research programs are scientifically and technologically well founded, are of excellent quality, are appropriate for their intended applications, and are capturing, validating, and communicating benefits of NASA research to the public.

1.1.2 The Office of the Chief Scientist includes the following responsibilities:

- a. Concurs on strategies and plans for research directions for NASA.
- b. Develops NASA's science policy, procedural requirements, and research misconduct policy and procedures.
- c. Provides oversight of science management and facilitates implementation of the White House Office of Science and Technology Policy and Office of Management and Budget (OMB) investment criteria of relevance, quality, and performance to ensure that NASA funds the most exemplary and meritorious science and research programs and projects to enable NASA to achieve its missions.
- d. Maintains and fosters communication links with the scientific and broader research community at large including, but not limited to, other governmental agency, academic, industrial, and international partners.
- e. Acts to encourage cooperation and synergy among the science and research programs other NASA programs.
- f. Validates and communicates benefits of NASA research to the public.
- g. Serves as a representative for NASA's civil service scientific and research community, as necessary, for such activities as functional and workforce planning; advocates for a high-quality internal R&D capability and civil service personnel knowledgeable of the forefront of scientific research.
- h. Advises on science core competencies required by NASA.

1.2 Scientists at NASA Headquarters, NASA Centers, and the Jet Propulsion Laboratory

To fill NASA's needs for science guidance and oversight, NASA shall support a civil service scientific staff responsible for the following tasks:

1.2.1 Program Scientists at NASA Headquarters

NASA Program Scientists manage the science content of programs and projects at the mission or theme level to ensure continuity, complementarity, and comprehensiveness in all activities relating to a particular science mission or theme. They lead the solicitation and selection process for NASA-funded research at NASA Centers, the Jet Propulsion Laboratory, universities, other government agencies, and private and non-profit institutions. They support cross-Mission Directorate activities and serve as a resource in disciplinary areas for Mission Directorate and NASA-wide activities. They work with other domestic and international agencies to assure effective integration between NASA programs and those of our counterparts. The Program Scientists guide the scientific and research program and project planning process and ensure that proposed instruments and data acquisition and analysis techniques are appropriate and will deliver the intended product to the appropriate users or archive. The Program Scientists participate in program performance evaluations, provide the MDAA's feedback on the effectiveness of the programs, and recommend improvements. They integrate space missions with relevant laboratory, sub-orbital, and computational science. Program Scientists are located at NASA Headquarters unless a program is managed at a NASA Center. They are also referred to as Mission Directorate Scientists.

1.2.2 Project Scientists and Deputy Project Scientists at NASA Centers

The Project Scientist has the primary responsibility of working with the Principal Investigator and Project Manager to ensure that the science requirements are defined and met. They also help to coordinate research activities with those of the national and international partners. Deputy Project Scientists assist with the various duties of the Project Scientist. The Project Scientist and Deputy Project Scientist are expected to maintain their scientific viability and scientific knowledge current within the scope of the mission/project. These scientists are located at NASA's Centers.

1.2.3 Scientists Working on Peer-Reviewed Basic Scientific Research

This category of scientist works on program-related tasks such as helping NASA Headquarters Program Scientists develop new missions and mission lines, mission science operations, data systems and software development, data analysis algorithms, modeling and data assimilation techniques, and mission hardware development. Some of these scientists may also perform the role of Project Scientist. Concomitantly, these scientists shall perform high-quality research subject to and corroborated by peer review that contributes to NASA strategic goals and ensures the capabilities of these scientists to make highly credible contributions in the evaluation, formation, and evolution of NASA programs. In addition, their research may provide the impetus for new, innovative, and groundbreaking scientific disciplines such as astrobiology. These scientists, in general, compete for grants and contracts with their university counterparts and provide a working-level link between NASA and the scientific community. These scientists are located at NASA's Centers.

1.2.4 Other Scientists Working, e.g., on Space Flight Hardware or Theory Related to Missions

This category of scientist provides in-house expertise to essential, NASA-unique tasks. These scientists develop an expertise via research and analysis specific to NASA-unique tasks that cannot be readily obtained elsewhere. They may serve as a resource for industry and academia in areas specific to their fields. This science role is complementary to the Project Scientist role. One aspect of this job may be to provide the theoretical and technical basis for the development of new capabilities or missions. This may be done, for example, via observing systems simulation or analyses of observations from predecessor missions or instruments for the purposes of indicating what additional capabilities are required or possible to achieve present or future scientific requirements or goals. Such work may also involve analyses that show the basis for continuing a historical data record across generations of instruments and experiments. Additionally, these scientists may also be responsible for developing the theoretical and practical techniques for the validation of data (ground truth), algorithm development, and modeling/data assimilation or may provide expertise in specific, required NASA-related technologies such as optics and laser materials, or those requisite for microwave and optical observing systems and information processing and analysis capabilities. These scientists are located at NASA's Centers.

1.3 Mission Directorate Associate Administrators

The Mission Directorate Associate Administrators (MDAA) are the leaders of NASA's Mission Directorates. Their specific roles are described in NPD 1000.3, The NASA Organization, and NPR 1000.2, NASA Strategic Management Handbook.

1.4 Principal Investigators

Principal Investigators are scientists external or internal to NASA who have received funding to perform specific research tasks. They are selected using the procedures described in Chapter 2 of this document, Sections 2.3 and 2.4. Their role is to conduct research and to publish their results in refereed journals or to develop and deliver other products (such as innovative and enabling technology, algorithms, software, or recommended operational procedures) as specified in their NASA funding instrument. They may provide findings to NASA by participating in Advisory Committees (see NPD 1000.3, The NASA Organization, Section 6.2, Federal Advisory Committee Act (FACA) Committees) and by participating in peer review panels.

1.5 The NASA Science Council

The NASA Science Council provides advice, counsel, and recommendations for consideration by the Administrator and other management forums on all aspects of science related to NASA's flight and ground programs. The NASA Science Council reports to the Administrator through the Chief Scientist. At a minimum, members of the Science Council shall include MDAA's (or their designees who have a responsibility for flight and ground programs), the

Assistant Administrators for the Offices of External Relations and Human Capital Management, and the Chief Education Officer. The NASA Science Council Charter is contained in NPD 1000.3, The NASA Organization, Section 6.11, and provides additional information about the purposes of the NASA Science Council, its membership, and their roles and responsibilities.

Chapter 2. Planning and Management of Scientific Research

The following sections describe the required elements for the management of scientific programs at NASA. NASA Science Programs are initiated with the advice of the scientific community in the form of studies or Advisory Committee recommendations. These inputs are used by the MDAA's, with assistance from the Program Scientist and Managers, to develop priorities and plans which are documented in the Mission Directorate Strategies. Research is solicited and selected based on these priorities and plans through the use of Broad Agency Announcements (BAAs) and other mechanisms described in this chapter. This chapter also describes the selection mechanisms that are used by Program Scientists to ensure a balanced research portfolio. Finally, this chapter addresses how to minimize conflicts of interest and the role of partnerships and international collaborations in the success of a NASA Science Program.

2.1 Acquire Advice

2.1.1 Definition and Objective

To ensure the high quality and currency of NASA research, science programs shall be formulated to address leading-edge science and technology questions as determined through dialog with the external science community. This context includes the status of progress in relevant areas of specialization and the relative value of alternative directions for future work.

2.1.2 Responsibilities

The cognizant MDAA is responsible for acquiring advice on that Mission Directorate's activities from NASA customers and stakeholders in accordance with NASA policies and practices. Copies of the resulting reports and any correspondence documenting the disposition of recommendations shall be forwarded to the Office of the Chief Scientist by the Mission Directorate or Functional Office requesting the advice.

2.1.3 Requirements

2.1.3.1 NASA shall use a broad variety of mechanisms to obtain external input, including, for example, advisory committees comprised of outside experts and contracted studies. Advice may be obtained from NASA-formed advisory committees that report to the NASA Advisory Council. Studies may also be requested from for-profit concerns, professional societies, the National Research Council, or other qualified organizations, depending on the specific need.

2.1.3.2 NASA-formed advisory committees shall be established and managed in accordance with NPD 1000.3, The NASA Organization, Section 6.2, Federal Advisory Committee Act (FACA) Committees. In seeking advice on a given topic or area, NASA shall seek to maximize expertise and objectivity; this will often require balancing the independence of advising individuals or organization(s) who receive NASA funding against the need for familiarity with NASA programs and issues. While performing duties related to program oversight, individuals that could reap financial gain from participating in these committees or boards must consider conflict of interest rules and must be selected using a strict definition of independence to avoid conflict of interest or the appearance of conflict of interest.

2.2 Plan and Set Priorities

2.2.1 Definition and Objective

Scientific research priorities are based on strategies and implementation plans derived from advice received, R&D investment criteria of relevance, quality, and performance, and other considerations and are aligned with NASA's Vision and Strategic Plan. These plans articulate the rationale for knowledge acquisition and the strategies for acquiring

knowledge. Programmatic or societal considerations can enter the planning and priority-setting process at several stages. Contributions to broad national needs identified by the Administration or Congress will play a role in establishing priorities and in shaping or arriving at the decision to proceed with a particular mission or program. These priorities and plans are usually documented as NASA Roadmaps or Mission Directorate Strategies or Roadmaps. The NASA Administrator, in coordination with the NASA Chief Scientist and the MDAAs, sets NASA policy and assigns actions to implement that policy.

2.2.2 Responsibilities

The cognizant MDAA is responsible for the planning and setting priorities for the activities of each Mission Directorate. The MDAA is also responsible for ensuring that the priorities are publicly accessible.

2.2.3 Requirements

2.2.3.1 Each Mission Directorate shall carry out and document a strategic planning process as referenced in NPR 1000.2, the NASA Strategic Management Handbook. These strategic planning activities shall support the NASA-wide strategic management process, including preparation of the NASA Strategic Plan and the implementation of the GPRA.

2.2.3.2 NASA shall emphasize the use of external advice as described in Section 2.1 for those parts of the priority-setting process most dependent on scientific or technical merit. The setting of priorities requires the balancing of many factors: NASA strategic goals, scientific merit, technical feasibility, resources availability, safety, likelihood of mission success, potential environmental impact, and national policy.

2.2.3.3 The processes used to set priorities shall be clearly and publicly promulgated in the interest of fostering stakeholder input and credibility among non-participants. NASA stakeholders shall be included in the strategic planning process, taking into consideration issues that include conflict of interest and Federal Advisory Committee Act (see NPD 1000.3, The NASA Organization, Section 6.2, Federal Advisory Committee Act (FACA) Committees).

2.2.3.4 Priorities and plans shall be documented as NASA Roadmaps or Mission Directorate Strategies or Roadmaps and shall be used as guidance for solicitations.

2.2.3.5 Whether through incorporation into the NASA Strategic Plan, Mission Directorate Strategy documents, or by other means, the rationale and conclusions of priority setting shall be made publicly available, for example, via the NASA website.

2.3 Solicitation of Scientific Investigations

2.3.1 Definition and Objective

NASA science and research programs are conducted as part of flight and ground-based programs or to complement or support the acquisition of knowledge through flight and ground-based programs. Along with the conduct of strategic planning and program evaluation, the use of peer review is an integral part of NASA's policy to ensure quality and leadership in science and technology research.

2.3.2 Responsibilities

2.3.2.1 Selection and funding of the science and research activities of each Mission Directorate are ultimately the responsibilities of the MDAA. Selection may be delegated to a Division Director, who shall present the selection to the MDAA.

2.3.2.2 Headquarters Program Scientists shall be in charge of and direct all aspects of the solicitation process, including the identification and invitation of peer review personnel, in-person monitoring of the deliberations of any peer review panel, and the monitoring of conflicts of interest that may be declared by panel personnel. Personnel assigned to NASA under the Intergovernmental Personnel Act or detailees from other agencies may also conduct these tasks.

2.3.2.3 Execution of science and research activities is the responsibility of selected performers under the oversight of the Headquarters Mission Directorate management as referenced in NPR 1000.2, The NASA Strategic Management Handbook and NPD 1000.3, The NASA Organization.

2.3.2.4 The Mission Directorates that solicit, select, fund, and conduct research are responsible for maintaining statistics on this process for their respective research programs. These statistics shall be provided to the NASA Science

Council and the NASA Chief Scientist and shall be reported annually as part of GPRA reporting (refer to Section 3.3) and the Performance Assessment and Rating Tool (PART).

2.3.3 Requirements

2.3.3.1 Competition and merit review are strongly encouraged. For assuring competition and merit-based selections of science and technology research proposals, open solicitation and peer review shall be the standard method. Other methods used for determining merit for selection must provide assurance that the resources involved are provided to the most capable performers available to demonstrate the most effective use of data and funding. Research programs and projects shall be executed by Center and Jet Propulsion Laboratory (JPL) personnel and by recipients of grants, cooperative agreements, and contracts selected via the process described below.

2.3.3.2 Mission Directorates that solicit, select, fund, and conduct scientific research shall submit to the Office of the Chief Scientist information about their science and research programs. The specific reporting requirements are described in section 3.3.1.

2.3.4 Peer review

2.3.4.1 Scientific peer review is a process in which a group of technically capable people with reputations for integrity and relevant expertise is convened to provide, to the maximum extent possible, unbiased evaluations of the scientific significance and technical validity of proposed work. More specific goals of scientific peer review are to:

- a. Determine the quality, relevance, and value of the work being proposed.
- b. Identify the work most likely to succeed, or that although it might be high risk, result in high reward.
- c. Assess the relative merits of the proposed work with current knowledge and similar work proposed by competing groups.
- d. Demonstrate to internal and external communities that balance and fairness are achieved in arriving at scientific and technical decisions by making the scientific communities themselves participants in the selection process.

2.3.4.2 To accomplish the goals of peer review, NASA shall ensure that:

1. Reviewers are knowledgeable and collectively cover the full range of scientific and technical expertise required for thorough proposal evaluation.
2. Conflicts of interest are scrupulously avoided to the greatest extent possible.
3. NASA programmatic and technical needs and requirements are understood, as described in the research solicitation.
4. The criteria for evaluation are well defined and understood and are accepted by the reviewers, traceable to the needs and requirements outlined in the research solicitation, and objectively stated in that solicitation.

2.3.4.3 A central role of NASA Headquarters Program Scientists is to form diverse expert review panels (possibly including mail reviews) that encompass the full range of scientific and technical expertise required for reviewing research proposals. Such expertise must be drawn from the widest possible talent pool. NASA Headquarters Program Scientists must also ensure that peer review panels are adequately informed about the scientific and technical requirements and constraints that proposals are expected to satisfy, as these constitute an important part of the basis for evaluation. Another role of Headquarters Program Scientists is to identify and eliminate, minimize, and balance potential conflicts of interest in the peer review process.

2.3.4.4 To maintain equity in competitions in which personnel of a Center or JPL may be participants, selection of investigations and investigator teams is always a function of the NASA Mission Directorates at Headquarters or, when applicable, Functional Office managers at Headquarters.

2.3.4.5 NASA's annual goal shall be to allocate at least 80 percent of its research funds via peer review.

2.3.5 Waiver from the Peer Review Requirement

2.3.5.1 A proposal shall be considered for a waiver from the peer review process, but not merit review, if the proposal meets any of the following criteria:

- a. Proposals to provide unique infrastructure facilities or capabilities necessary for the conduct of scientific research and development programs and for which the requisite experience and technical background to provide competent peer-review is not available.

- b. Small grants of less than \$40,000 for activities such as scientific meetings and publications by recognized scientific organizations.

2.3.5.2 For proposals under 2.3.5.1.a. costing less than \$100,000 total and small grant proposals under 2.3.5.1.b., waivers may be granted by the responsible MDAA or the MDAA's designee. For waivers of proposals under 2.3.5.1.a. costing \$100,000 or more, additional concurrence of the NASA Chief Scientist shall be obtained.

2.3.6 Solicitation Mechanisms

2.3.6.1 NASA shall solicit proposals for basic scientific research investigations using Broad Agency Announcements (BAAs). Standard forms of BAAs are the Announcement of Opportunity (AO) and NASA Research Announcement (NRA). The NASA Cooperative Agreement Notice (CAN) is used less frequently. BAAs, NRAs, AOs, and CANs are also referred to as "research solicitations." Refer to NPR 5800.1, Grant and Cooperative Agreement Handbook (14 CFR Part 1260, Grants and Cooperative Agreements), for more information.

2.3.6.2 A general BAA is used to solicit basic or applied research or innovative technological approaches or hardware that is characterized as being a part of the Mission Directorate's ongoing approved research and technology program under the budgetary discretion of the MDAA. The result of BAAs is new knowledge, innovative technology, or data that are to be made publicly available. Basic research investigations do not lend themselves to specific performance or engineering specifications; consequently, standard requests for proposals (RFP) are not used to solicit NASA basic scientific research proposals. Additional information can be found in NASA FAR Supplement Part 1835, Research and Development Contracting, and Part 1872, Acquisition of Investigations.

2.3.6.3 The AO is used to solicit and competitively select basic or applied research investigations characterized as having a well-defined purpose and end product; for example, science investigations with hardware responsibility for a unique space flight mission, a program of flight missions (such as Explorer and Discovery), or unique but large-cost non-flight programs (such as NASA support of the Keck Telescope). The AO can also be used for the selection of a science team for a flight mission, with responsibility for data analysis and mission operations. Investigations selected through an AO can range in cost from a few hundred thousand dollars to several hundred million dollars. The key features of the AO process are:

- a. The opportunity is relatively unique,
- b. The supporting budget is usually a unique line item authorized by Congress, and
- c. It is both a program-planning system and an acquisition system contained in one procedure.

The NASA Office of General Counsel, Office of Procurement, and Office of External Relations shall review the AO for adherence to NASA legal and procurement regulations and NASA policy regarding international cooperation. Following these concurrences, the appropriate NASA Mission Directorate official (as described in section 2.3.2.1) approves and signs the AO.

2.3.6.4 The NRA is used to solicit basic or applied research that is characterized as being a part of the Mission Directorate's ongoing approved research program under the budgetary discretion of the MDAA. The NRA solicits relatively low-cost supporting research investigations that are characterized as being of high relevance to NASA's program interests but in which a specific end product or service is not well-defined but left to the creativity of the proposer. NRAs are typically used to solicit and competitively select proposals for ongoing programs (although some may be singular in nature such as a data analysis program) funded by NASA's Mission Directorate budget designated for research. Research support is used to help understand natural space phenomena and research and technologies related to understanding these phenomena, including theoretical studies and ground-based laboratory developments. The NASA Office of General Counsel, Office of Procurement, and Office of External Relations shall review the NRA for adherence to NASA legal and procurement regulations and NASA policy regarding international cooperation. Following these concurrences, the appropriate NASA Mission Directorate official (as described in section 2.3.2.1) approves and signs the NRA.

2.3.6.5 The CAN shall be used to solicit and competitively select proposals to support NASA program interests that require a high degree of cooperation between NASA and the selected institution. The scope of activities solicited by a CAN may be as modest as those through an NRA or as complex as those through an AO. The cooperative agreements awarded as a result of a CAN are similar to grants except that both NASA and the selected institution are required to provide resources. The NASA Office of General Counsel, Office of Procurement, and Office of External Relations shall review the CAN for adherence to NASA legal and procurement regulations and NASA policy regarding international cooperation. Following these concurrences, the appropriate NASA Mission Directorate official (as

described in section 2.3.2.1) approves and signs the CAN.

2.3.7 Proposal Evaluation

2.3.7.1 As a general rule, the evaluation of intrinsic merit of solicited proposals includes consideration of the following factors:

- a. Overall scientific merit of the proposal or unique and innovative methods, approaches, concepts, or advanced technologies demonstrated by the proposal;
- b. The scientific or technical merit is evaluated as it relates to the unique objectives described in the BAA, CAN, or other request for a proposal;
- c. Offeror's capabilities, related experience, facilities, techniques, or unique combination of these that are integral factors for achieving the proposal's objectives;
- d. The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives; and
- e. Overall standing among similar proposals or evaluation against the state-of-the-art.

2.3.7.2 Proposals submitted to NASA shall be reviewed by panels, mail reviews, or a combination of both. These panels or mail reviews shall be comprised of the proposer's professional peers who have been screened for conflicts of interest. Typically, each member of the panel is provided with only a few of the proposals to read and report on in detail during the plenary meeting of the group. There shall be at least two such readers of each proposal. In all cases, however, copies of every proposal shall be available for inspection by the members of the panel while it is in session. The final consensus evaluation determined by the panel shall be reviewed and approved for completeness and clarity by the chairperson of the panel and the attending NASA Program Officer. Mail reviews shall reach consensus via a teleconference led by the responsible NASA Program Officer and the mail review panel chair. If consensus is not reached after a good faith effort, an additional reviewer is invited to participate.

2.3.8 Unsolicited Proposals

2.3.8.1 Unsolicited proposals are defined as those submitted to NASA on the initiative of the applicant rather than in response to a BAA or CAN. In accordance with the NASA FAR Supplement, the information NASA personnel may provide in discussing the development of an unsolicited proposal is limited to the general need for the type of effort contemplated for the proposal and, as appropriate, to the names of other NASA personnel for the limited purpose of obtaining an understanding of the NASA mission and responsibilities relative to the type of effort contemplated. NASA personnel may not "solicit," that is, request a proposal. The decision to submit an unsolicited proposal rests with the proposer alone. When a NASA Principal Investigator successfully competes for research funding but has not identified all or part of his or her research group, the award creates a program or project requirement to solicit proposals for prospective participants. These proposals shall not be treated as unsolicited proposals.

2.3.8.2 The procedures and criteria for handling unsolicited proposals are contained in NASA regulations (14 CFR Subpart 1815.6, Unsolicited Proposals), NASA Grant and Cooperative Agreement Handbook, and the NASA Guidance for the Preparation and Submission of Unsolicited Proposals. These sources are subject to frequent change, and NASA Program Scientists or Managers should check for the latest versions and any additional policy guidance that may be relevant.

2.3.8.3 If an unsolicited proposal is determined to be valid, NASA shall conduct an appropriate peer review, following the criteria described in section 2.3.2.2, after which the proposal shall be submitted to an appropriate NASA Selection Official for selection or rejection. Waivers from the peer review process may be granted for proposals that meet the criteria stated in Section 2.3.3.

2.3.8.4 Selection of foreign investigators shall be forwarded to the Office of External Relations for concurrence prior to notifying the proposer.

2.3.9 Congressionally Directed Funding

Congressionally directed funding for science and research programs and policies is often divided between assistance to non-Federal entities (site-specific) and increases to specific NASA programs (programmatic). Proposals submitted in response to Congressionally directed site-specific funding are normally evaluated using criteria based upon those included in the NASA Guidance for Preparation and Submission of Unsolicited Proposals but are not necessarily peer reviewed. Technical evaluations to assure the validity of the evaluation and the independent quality inherent in merit

review may be carried out by a qualified person who is not serving as the Technical Officer. The independent technical evaluation, if done in this manner, should not require the independent technical evaluator to make a recommendation for funding. If an impasse occurs after a good faith effort to resolve outstanding issues has been made, the cognizant MDAA shall inform the Office of the Chief Scientist.

2.4 Selections and Program Decisions

2.4.1 Definition and Objective

After solicitation and peer review of proposals, NASA Program Scientists recommend to their upper management the suite of proposals that should be selected for funding. These recommendations are based on the results of science or technical peer review, any program-unique criteria (such as program balance) stated in the solicitation, its relevance to the research objectives stated in the solicitation and to NASA's strategic goals in general, its comparison to competing proposals of equal merits and objectives, and the available budget resources. The NASA Selection Official (as identified in the solicitation) makes the selection.

2.4.2 Responsibilities

2.4.2.1 NASA Program Scientists, with support of the Mission Directorate Discipline Scientists, are responsible for developing a recommendation for the selection or non-selection of each evaluated proposal.

2.4.2.2 For AOs, the proposals are categorized and, in accordance with NFS 1872, Acquisition of Investigations, reviewed by an AO Steering Committee prior to submission of the recommendation for selection.

2.4.2.3 The NASA Selection Official (as identified in the solicitation) is responsible for the selection.

2.4.3 Requirements

2.4.3.1 Non-discrimination. Prior to selection, the NASA Program Scientist shall provide to the Assistant Administrator (AA), Office of Diversity and Equal Opportunity Programs (ODEO), all information submitted by the proposer. As the NASA's Principal Civil Rights Compliance Officer, the AA for ODEO shall certify civil rights compliance of the proposed selectee, based on a review of the data submitted, pursuant to Department of Justice regulations. Where a determination cannot be made from this data, NASA shall require the submission of necessary additional information and shall take other steps necessary for making the determination. Such other steps may include, for example, communicating with local government officials or minority group organizations and field reviews. NASA shall promptly notify the Assistant Attorney General of instances of probable noncompliance determined as the result of an application review or post-approval compliance reviews.

2.4.3.2 Environmental Quality. Prior to selection or approval, the NASA Program Scientist shall assure that the regulations, policies, and requirements for assuring environmental quality, including environmental review of the proposed action have been met. Early in the proposal review process, the NASA Program Scientist shall contact the respective Headquarters or Center Environmental Management Office for specific requirements applicable to the proposed activity, including NASA funded or approved activities.

2.4.3.3 Care and Use of Animals. Prior to selection or approval, the NASA Program Scientist shall assure that NASA regulations, policies, and requirements for review and approval of the use of animals in research have been met, if research involving the use of animals is proposed.

2.4.3.4 Use of Human Research Subjects. Prior to selection or approval, the NASA Program Scientist shall assure that NASA regulations, policies, and requirements for review and approval of the use of human subjects in research have been met if research involving the use of human subjects is proposed.

2.4.4 Overview of the Selection Process

2.4.4.1 Overview of the Process from Proposal Submission through Selection Using Peer Review

- a. The responsible MD Program Officer (usually the Program Scientist) selects the panel and, if used, mail reviewers based on their known expertise relevant to the content of each proposal.
- b. The peer reviewers determine the scientific and technical merits of each proposal, consistent with the evaluation factors stated in the solicitation. The responsible MD Program Officer (usually the Program Scientist) or another NASA Headquarters employee monitors the peer reviewers.

- c. A recommendation for the selection or non-selection of each proposal is developed by the responsible MD Program Officer (usually the Program Scientist) and presented to the Selection Official (as identified in the solicitation) based on the results of its scientific or technical peer review, any program-unique criteria (such as program balance) stated in the solicitation, its relevance to the research objectives stated in the solicitation and to NASA's strategic goals in general, its comparison to competing proposals of equal merits and objectives, and the available budget resources. The NASA Selection Official makes the selection. In some cases NASA may elect to offer selection of only a portion of a proposed investigation. Partial selection is discussed in more detail in Section 2.4.5.
- d. After selection, each proposer is notified by letter or electronic mail of the disposition of the proposal. Unless otherwise specified in the solicitation, each proposer should be offered a debriefing based on identified strengths and weaknesses. For example, the average peer review score and the written discussion are commonly sent to the proposer for information.
- e. The responsible MD Program Officer (usually the Program Scientist) forwards official notification of selection and required documentation to the appropriate NASA Procurement Office, which contacts the proposing institution to negotiate funding and all required terms and conditions through an appropriate award instrument.
- f. Selection of foreign investigators shall be forwarded to the Office of External Relations for concurrence prior to notifying the proposer. External Relations shall also be notified of all proposals from foreign investigators that were not selected.
- g. For AOs, the proposals are categorized and, per NFS 1872, reviewed by an AO Steering Committee prior to submission of the recommendation for selection.

2.4.5 Partial Selections

NASA may elect to select only a portion of a proposed investigation, usually at a level of support reduced from that requested in the original proposal. In such a case, the proposer shall be given the opportunity to accept or decline selection based on the reduced effort and/or budget. If the proposer accepts such an offer, a revised budget and statement of work may be required before funding action on the proposal is initiated. If the proposer declines the offer of a partial selection, NASA may withdraw the offer of selection in its entirety.

2.4.6 Disclosure of Selections and Non-Selections

For selected proposals, NASA considers the Proposal Title, the Principal Investigator's name and institution, Co-Investigators' names and institutions (if applicable), and the Proposal Summary to be in the public domain and shall post that information on an appropriate publicly accessible location. Where applicable, this language should be included in the BAA. Selected proposers may release additional information about their proposals. However, NASA considers other portions of proposals to be proprietary and, therefore, shall not release these sections of successful proposals to the public without consultation with the proposer.

2.4.7 Debriefing of Proposers

A proposer has the right to be informed of the major factor(s) that led to the acceptance or rejection of the proposal unless the competitive solicitation explicitly states otherwise. At the discretion of the NASA Program Officer, such debriefings may be oral, written, or both. A proposer may request a face-to-face debriefing at NASA Headquarters. NASA funds shall not be used to defray travel costs. NASA shall make non-selected proposers aware that proposals of nominally high intrinsic and programmatic merits may be declined for programmatic reasons that are entirely unrelated to any scientific or technical weakness. The language in this section shall be in the BAA.

2.4.8 Rejection of Proposals without Prejudice

The non-selection of a proposal does not restrict the submission of a similar or even the same effort by the proposer(s) in response to appropriate future NASA solicitations or to other appropriate funding agencies or organizations. However, if submission of the same or nearly the same proposal to NASA in the future is contemplated, proposers should be strongly urged to carefully consider the totality of the comments offered during their debriefing, as well as the proposal guidelines, before making their decision. Merely correcting any perceived deficiencies in a proposal as noted by a review process for one NRA in no way guarantees a higher rating in another solicitation.

2.5 Partnerships and International Collaboration

2.5.1 Definition and Objective

It is NASA's policy to encourage the participation of industry, academia, other non-profit organizations, and other Government agencies in NASA's research (NPD 1080, NASA Science Policy). For ground-based and flight research, BAAs and CANs should encourage proposals from the sources, and such proposals shall be evaluated following the requirements listed in Section 2.3 of this document.

2.5.2 Responsibilities

2.5.2.1 The Office of External Relations in conjunction with the relevant Mission Directorate shall negotiate all international collaborations. All international negotiations follow NPD 1360.2, Initiation and Development of International Cooperation in Space and Aeronautics Programs.

2.5.3 Requirements

2.5.3.1 For collaborations involving NASA, each partner shall assume full financial responsibility for its own commitments, pursuant to NPD 1360.2, Initiation and Development of International Cooperation in Space and Aeronautics Programs.

2.5.3.2 Any foreign contract acquisition valued above \$100,000 or involving export control issues shall be coordinated with the Office of External Relations, in accordance with NFS 1825.7002, Foreign Contracts.

2.5.3.3 International agreements that contemplate the procurement of goods or services using U.S. appropriated funds, unless done solely on a cooperative basis, shall require Office of Procurement concurrence, in accordance with NFS 1825.7003, International Agreements.

2.6 Conflict of Interest and Confidentiality

The issues of conflict of interest and confidentiality are of critical importance to the peer review process. If reviewers are not Federal employees, they shall be required to execute a nondisclosure or confidentiality agreement. All reviewers of NASA proposals are to be directed by NASA to avoid not only actual but also any apparent conflicts of interest and to maintain confidentiality about all activities involved in the review process. For example, a selection process could be nullified by the disclosure of a conflict of interest after selection or breach in confidentiality. Reviewers are personally responsible for identifying and disclosing to the responsible NASA Program Officer any conflict of interest situations, as well as maintaining confidentiality regarding each proposal that they handle or to which they may be exposed during the course of the review process. Regardless of whether the review process is conducted by mail or by a convened panel, the presiding NASA Program Officer addresses and resolves conflicts of interest based on the general requirements stated in the Guidebook to Proposers to NASA Research Announcements, Section C.4. The NASA General Counsel is responsible for assisting with the resolution of conflicts of interest.

2.7 Retention of Records

All documentary information, regardless of format, made or received in the course of conducting NASA science programs are Federal records and shall be maintained, safeguarded, and dispositioned in accordance with NPR 1441.1, NASA Records Retention Schedules.

Chapter 3. Quality Assessment Process and Performance Measurement Metrics

3.1 Background Information

3.1.1 As stated in this document, NASA shall make extensive use of expert review panels to assess the quality and performance of its science programs. The peer review process shall follow the recommendations of the National Academy of Sciences (NAS) in the report entitled Implementing the Government Performance and Results Act for Research using quality, relevance, and leadership as evaluation criteria for the research programs. Quality is a measure of the degree of excellence of the research and its potential to advance knowledge, as well as its rank in a particular field of research. Relevance is an indicator of how well integrated the research is to the goals and objectives of NASA's strategic plans and roadmaps. World leadership in science can be evaluated through international benchmarking using national and international experts. Quality of research is commonly evaluated by peer review. Selection of peer review panels follows the criteria recommended by OMB as specified in Section 2.3.4 of this document.

3.1.2 In May 2002, the Office of Science and Technology Policy and OMB issued a memorandum describing criteria for assessing Research and Development (R&D) Programs, based on the NAS's document described above.

The criteria specified in the memorandum require that managers of R&D programs demonstrate the extent to which their programs meet the following three tests:

- Relevance R&D programs must be able to articulate why this investment is important, relevant, and appropriate. Programs must have well-conceived plans that identify program goals and priorities and identify linkages to national and "customer" needs.
- Quality R&D programs must justify how funds will be allocated to ensure quality R&D. Programs allocating funds through means other than a competitive, merit-based process must justify these exceptions and document how quality is maintained.
- Performance R&D programs must have the plans and management processes in place to monitor and document how well this investment is performing. Program managers must define appropriate outcome measures and milestones that can be used to track progress toward goals, and assess whether funding is to be enhanced or redirected.

The R&D criteria address not only planning, management, and prospective assessment but also retrospective assessment. Retrospective review of whether investments were well-directed, efficient, and productive is essential for validating program design and instilling confidence that future investments will be wisely made. Retrospective reviews should address continuing program relevance, quality, and successful performance to date.

3.1.3 NASA demonstrates compliance with these criteria in the Integrated Budget and Performance Document. NASA internal reviews of research programs include annual project- and program-level assessments at NASA Centers, contractor sites, and NASA Headquarters. For external review, NASA relies on panels of scientific experts to ensure that science proposals are reviewed and selected on the basis of scientific merits. The NASA Advisory Council, National Research Council, and National Academy of Science may perform additional reviews.

3.1.4 Several mechanisms are used to measure the performance of the NASA science programs. Some of the mechanisms are Governmentwide mandates, such as GRPA and PART (Sections 3.3 and 3.4), and are reported annually. Because the outcome of scientific research may be difficult to evaluate on a short-term basis, a retrospective assessment covering the previous 2 to 3 years shall be used to provide a more complete and accurate indicator with respect to the quality, relevance, and performance of the research. A retrospective assessment can be used as a metric to indicate progress along the science program roadmaps. Looking at the inputs provided, the outcomes achieved, and the values of those outcomes to the science community determine performance measurements. Each Mission Directorate sponsoring scientific research shall select metrics to be used in its performance assessment report and coordinate the assessment with the appropriate advisory group, such as the National Research Council or the NASA Advisory Council and its committees.

3.2 Responsibilities

The MDAA's are responsible for conducting the assessment of their science and research programs, using the current R&D investment and other criteria, and for collecting and submitting performance metrics to the NASA Chief Financial Officer and the NASA Chief Scientist for review.

3.3 Reporting Requirements

3.3.1 At the beginning of the fourth quarter of each Fiscal Year, MDAA's shall submit the following information to the NASA Chief Scientist:

- a. Number of BAAs and CANs issued during the Fiscal Year.
- b. Number of proposals received during the Fiscal Year in response to BAAs and CANs.
- c. Number of unsolicited proposals received during the Fiscal Year.
- d. Total number of proposals selected, the number of proposals selected using peer review during the Fiscal Year, distributed by whether the proposals were submitted in response to a BAA, CAN, or were unsolicited.
- e. For the Fiscal Year, the number of participating institutions represented by Principal Investigators and Co-investigators who submitted and who were selected, broken down whenever possible by state.
- f. For the Fiscal Year, the number of proposals selected from different sources, broken down by NASA intramural, industry, academia, other non-profit organizations, other Federal agencies, and other Governmental (non-Federal) agencies.
- g. For the Fiscal Year, the budget available for sponsored research, the budget disbursed for peer-reviewed proposals, and the budget disbursed for proposals not peer reviewed.
- h. For the Fiscal Year, average funding per award.

3.3.2 A compilation of these statistics shall be reported as part of NASA's annual performance report.

3.4 Evaluation of Science Programs under the GPRA

The GPRA requires the following activities: an Agency-level strategic plan that sets goals and objectives, an annual performance plan that translates goal into annual targets, and an annual performance report that demonstrates whether targets are met. Each of the Mission Directorates submits a report on annual performance goals, based on its strategic plans, for review by the NASA Chief Financial Officer and OMB before it is sent to Congress as mandated by GPRA.

3.5 The Program Assessment and Rating Tool (PART)

3.5.1 The PART is a systematic method of assessing the performance of program activities across the Federal Government. OMB uses PART assessments to help link performance to budget decisions and to provide a basis for making recommendations to improve program results.

3.5.2 The PART is composed of a series of questions requiring objective data and evidence to assess programs across a range of issues related to performance. Although most PART questions are the same, there are several different versions of the PART that ask additional questions unique to a particular type of program (such as R&D, competitive grant). PART questions deal with program purpose and design, strategic planning, program management, and program results. The use of appropriate performance measures is a key component of the PART assessment.

3.5.3 NASA applies the PART tool to individual Themes and OMB assesses each Theme once every three years. Results of PART assessments, including OMB recommendations for improvement, are published each year with the President's budget request.

3.6 Retention of Records

All documentary information, regardless of format, made or received in the course of conducting NASA science programs are Federal records and shall be maintained, safeguarded, and dispositioned in accordance with the guidelines of NPR 1441.1, NASA Records Retention Schedules.

Chapter 4. Data Protection, Publication, and Disseminating Results

4.1 Quality of Scientific Information

NASA follows the Governmentwide guidelines issued by OMB in response to Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106-554; H.R. 5658). Section 515 directs OMB to "provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by Federal agencies. OMB defines "quality" as the encompassing term, of which "utility," "objectivity," and "integrity" are the constituents. "Utility" refers to the usefulness of the information to the intended users.

"Objectivity" focuses on whether the disseminated information is being presented in an accurate, clear, complete, and unbiased manner, and as a matter of substance, is accurate, reliable, and unbiased. "Integrity" refers to security -- the protection of information from unauthorized access or revision to ensure that the information is not compromised through corruption or falsification. NASA works to conform to these guidelines by using program reviews to ensure utility, peer review to measure objectivity, and following guidelines to protect integrity. NASA has established, per OMB requirements, a process by which members of the public can request correction of information that they feel does not meet guidelines for quality. The Office of the Chief Information Officer can provide details regarding this process.

4.2 Publication and Disseminating Results

4.2.1 NASA and NASA-sponsored authors are encouraged to publish in widely accessible peer reviewed journals and to make oral presentations at professional societies. Results of NASA Scientific and Technical Information (STI) must be published in the NASA STI Report series whenever possible. NASA policy and requirements for STI are described in the NPD 2200.1, Management of NASA Scientific and Technical Information and NPR 2200.2, Requirements for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information.

4.2.2 NASA and NASA-sponsored authors are also encouraged to support education and public outreach, collaborate with the NASA's Public Affairs Office in preparing press releases and related materials, and engage in community service activities such as serving on peer review panels and advisory bodies.

4.3 Data Protection

4.3.1 Protection of scientific data and documents shall be in accordance with the following:

- a. NPD 1440.6, NASA Records Management (regarding proper archiving and disposal of Federal records).
- b. NPD 1600.2A, NASA Security Policy.
- c. NPR 1600.1, NASA Security Program Procedural Requirements.
- d. NPR 2810.1, Security of Information Technology (regarding the integrity of data and protection from authorized access or change).
- e. NPR 7500.1, NASA Technology Commercialization Process (regarding data rights).
- f. NPD 2200.1, Management of NASA Scientific and Technical Information.
- g. NPR 2200.2, Guidelines for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information (regarding special handling for data with export control and other restrictions).

4.3.2 In addition, the two latter documents, NPD 2200.1 and NPR 2200.2, apply to data, the publication or distribution of which is restricted by law, regulation, or policy (such as data and information subject to National security classification, export control, archeological resources protection, or privacy protection, and proprietary information of the Government or others such as trade secret information, copyrighted information, Small Business Innovation

Research (SBIR) data, and documents disclosing inventions).

4.4 Responsibilities

4.4.1 NASA shall require all authors sponsored by NASA to be responsible for the quality of the scientific information submitted for publication or presented at technical meetings and for obtaining approval for dissemination of the information in accordance with NASA policy, procedural requirements, and guidelines. These requirements shall be included in the BAA.

4.4.2 The NASA Chief Information Officer is responsible for creating and disseminating policy related to data protection and information security.

4.5 Requirements

4.5.1 NASA places no requirements on publication or dissemination solely by contractors or grantees of the results of scientific research conducted under a NASA contract or grant. Contractors and grantees have the right to publish or disseminate data first produced by the contractor or grantee in the performance of a contract or grant, except to the extent such data may be subject to Federal export control or national security laws or regulations, or unless otherwise provided in the contract or grant. To the extent a contractor or grantee receives or is given access to data necessary for the performance of a contract or grant which contains restrictive markings, the data shall be treated in accordance with the markings.

4.5.2 NASA scientists and researchers who publish the results of their research shall follow NPR 2200.2, Guidelines for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information.

4.5.3 Scientific data shall be protected in accordance with section 4.3 of this document.

Chapter 5. Research Misconduct

5.1 Handling of Misconduct Allegations

NASA shall handle allegations of research misconduct following the requirements published by the Office of Science and Technology (65 Federal Register 76260, Dec. 6, 2000). NASA's policies and procedures for handling these investigations are published in the Code of Federal Regulation 14 CFR Part 1275, Research Misconduct.

5.2 Responsibilities

For their research that is sponsored by NASA, institutions are responsible for compliance with NASA's research misconduct policy. NASA individuals who receive allegations of researching misconduct shall notify the Inspector General. The NASA Inspector General is responsible for research misconduct inquiries and investigations and for the preparation and submission of its findings and recommendations in a report to NASA. The MDAA's are responsible for resolution of the Inspector General's conclusions and recommendations. The NASA Deputy Administrator is responsible for appeals to the MDAA decision.